MAY 8, 1922

AVIATION

VOL. XII. NO. 19

Member of the Audit Bureau of Circulations

CONTENTS

Editorials 533
The Spring Flying Meet at Garden City 534
Santa Maria Safe 537
Book Review 537
Forest Mapping and Estimating from the Air ... 538
Flight Testing of Suspended Wing 540
Influence of Model Surface and Air Flow Texture on Resistance 540
Soaring Flight in French Guinea 541
New Type of Wing 541
"Who's Who in American Aeronautics" 544
Seaplanes in Overseas Flights 545
Human Factors in Flying 545
Aeronautics Executives' Luncheon 546
Surplus MF Flying Boats 546
The Background of Detonation 546
The Hornespeed Propeller 546
An Interesting Sport Plane 547
Canadian Airharbors 547
Aerial Lighthouse, College Point, L. I. 547
Curtiss Activities 547
Army and Navy Air News 548
Coming Aeronautical Events 549
Foreign News 550

THE GARDNER, MOFFAT COMPANY, Inc., *Publishers*
HIGHLAND, N. Y.
225 FOURTH AVENUE, NEW YORK

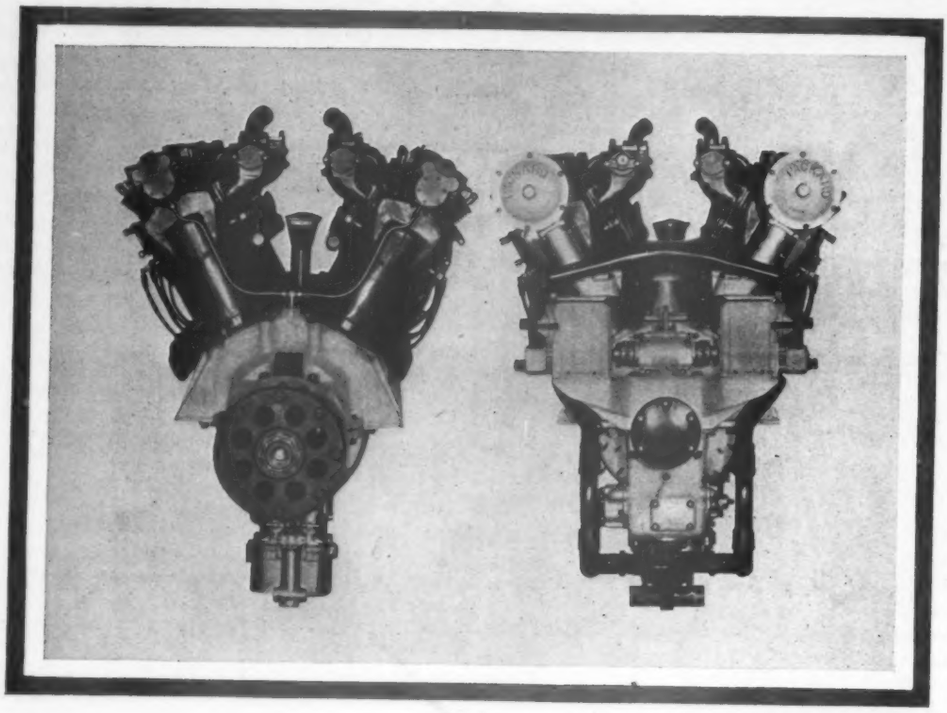
Subscription price: Four dollars per year. Single copies fifteen cents. Canada, five dollars. Foreign, six dollars a year. *Copyright 1922, by the Gardner, Moffat Company, Inc.*

Issued every Monday. Forms close ten days previously. Entered as second-class matter Nov. 22, 1920, at the Post Office at Highland, N. Y., under act of March 3, 1879.

THOMAS-MORSE AIRCRAFT CORPORATION

CONTRACTORS TO U. S. GOVERNMENT

ITHACA, NEW YORK



Safety Permits of No Compromise

Safety in Packard Aircraft Engines is assured by locating the carburetor at the bottom of the crankcase which makes it impossible for the engine to catch fire through back-firing of the carburetor.

PACKARD MOTOR CAR COMPANY, DETROIT, U. S. A.

PACKARD

Ask the man who flies one

L. D. GARDNER, PRESIDENT
W. D. MOFFAT, VICE-PRESIDENT
W. I. SEAMAN, TREASURER
GEORGE NEWBOLD, BUSINESS MANAGER

AVIATION

LADISLAS D'ORCY, EDITOR
VIRGINIUS E. CLARK
EDWARD P. WARNER
RALPH H. UPSON, CONTRIBUTING EDITORS

Vol. XII MAY 8, 1922 No. 19

Public Interest in Aviation

THE huge crowd which answered the call of the Spring Flying Meet at Garden City affords the best refutation of the belief that the public, as a whole, is not interested in aeronautical events. It is possible that "trick flying" and other sorts of aerial acrobatics, taken by themselves, have to a large extent lost the fascination they once used to exert upon crowds. This is due chiefly to the fact that there have been so many demonstrations of aerial acrobatics, at any rate in the neighborhood of the larger cities, that such exhibitions no longer are a novelty to a large percentage of Americans. This does not mean, however, that a meeting offering a well balanced program of flying events will not draw a crowd. Quite on the contrary.

It is quite surprising to what extent the knowledge of things aeronautical is beginning to penetrate that section of the public which is not directly concerned with aeronautics. At the Spring Flying Meet we have overheard much intelligent comment on the evolutions of the airplanes from people who obviously were outside the fold of the aeronautical world. Perhaps the fact that Long Island had during the war a great many Army flying fields has something to do with it. However that be, it is gratifying to see the progress the public is making in correctly appreciating the nature and significance of flying events.

This is an evolution which the aeronautical world ought to encourage and foster with all means at its disposal, for the sooner the public acquires what may be called an "aeronautical sense," the quicker will public air transport and private flying develop.

Organizers of flying meets can do much good in this direction by getting the public into more intimate touch with flying events than has been the case, with a few exceptions, heretofore. For instance, all aircraft participating in a meet should be marked with large letters or numerals so they can be recognized in flight, and the program should refer to them giving their type, horsepower and pilot. The highly successful flying meets held before the war at Hendon, near London, owed much of their success to the fact that the public had the means of knowing all the time what was going on in the air and who was doing it. Not only were the competing airplanes numbered, and duly listed in the program, but the latter also contained sketches of the machines as they would appear in flight, while a huge score board made public the time of the laps or other results. Thus the man who went to Hendon to learn something about how airplanes performed, and which performed best, and who was the most skillful flier, was given every opportunity to have his desire gratified.

Now it may seem on the surface that this catering to the interest of the wider masses is not warranted because it entails an expenditure out of proportion to the possible benefits. Nothing could be further from truth. The man who goes home from a flying meet where he was enabled to understand in a fair degree what was going on, instead of receiving the impression that "a lot of flying machines were doing tricks," is a potential asset to the aircraft industry. He may never be able to purchase an airplane, but he will go to the next meet, where his aeronautical knowledge will be increased, as a result of which he will begin to talk intelligently about things aeronautical.

In this manner, through a gradual process of evolution, an aeronautical opinion will be built up in this country. It does not seem likely that anyone would seriously suggest that we do not need such an opinion, whether in the matter of National Defense or in that of Commercial Aviation.

Heavy-Oil Engines for Aircraft

MUCH interest attaches to the announcement made by the National Advisory Committee for Aeronautics in connection with its recent annual meeting that it was pursuing the development of a heavy-oil engine for use in aircraft. While the details of the invention are still held confidential, it is known that this engine is of the direct injection type which does away with both carburetor and spark plugs, the fuel being ignited by subjecting it to a suitable pressure.

The subject of heavy oil engines has such an important bearing on the future of aircraft, and in particular of airships, that it seems desirable to summarize here briefly the different aspects of the question.

The principal advantages to be derived from such an engine are:—first, and foremost, safety from fire; second, fuel economy, which not only means lower fuel costs from the use of a much cheaper fuel than gasoline, but also, in all likelihood, greater weight economy in pounds of fuel consumed per horsepower/hour.

We may reasonably expect at the same time some disadvantages in the heavy-oil engine. Chief among these appear a greater fixed weight of the power plant, and perhaps also a decreased flexibility of control. The great problem that must be solved will be so to work out the design that the latter two items will at least remain within practical bounds, while preserving the reliability and, if possible, increasing it over that of present aircraft engines.

The light-weight heavy-oil engine, merely desirable today, will be the more necessary in the future as the demand for liquid fuel increases and the supply falls off. In the more distant future there may be foreseen the need of still another change—which we hope will be worked out before the need actually arises—the utilization of coal dust by direct injection in the engine.

The Spring Flying Meet at Garden City

Crowd of 20,000 Spectators Witnessed Brilliant Exhibition by Army, Air Mail and Civil Aviators

The Spring Flying Meet which was held on April 30 at Curtiss Field, Garden City, L. I., as a benefit for the Veterans Mountain Camp in the Berkshires, attracted a crowd estimated at more than 20,000 which taxed the capacity of the field, and whose cars jammed the roads for miles around. It was a mass of aeronautical enthusiasts such as had not been seen in a long time in the neighborhood of New York, and many "old timers" who had not seen one another for years held a joyous reunion under the judges' stand which seemed to draw them together as if they had pre-arranged it. Between the roar of the engines one could hear bits of conversation like —"Do you remember way back in 1912 when little Al Welsh used to make climbing turns and spiral descents on the Wright Model B?"—"Yes, and George Beatty had a flying school at Nassau Boulevard."—"And there were Blériots and Deperdussins (of a sort) flying at this field and Miss Harriet Quimby was the first American woman to get a pilot's license."—and so forth.

The meet was held under the joint auspices of the Curtiss Aeroplane and Motor Corp., the Rotary Club of New York, the Aero Club of America, the Aeronautical Chamber of Commerce and the American Legion. The occasion was the opening of the flying season of 1922 in this part of the country.

A Great Variety of Ships

Although there were several contests, the meet was strictly speaking more in the nature of an exhibition, and as such it was an unqualified success, for it enabled the public to see in action some twenty different types of airplanes and about forty machines altogether, although only twenty of these actually competed. The great variety of types seen in flight or on the ground may be visualized from the following list, which was hastily drawn up on the field:

Avro 504K	Farman F40
Curtiss "Cactus Kitten"	Fokker F3
Curtiss "Jennie"	Fokker Express
Curtiss Model 1909	Handley Page 0400T
Curtiss Oriole	Martin MB2 Bomber
Curtiss Standard	Messenger
DH4 (Air Service)	Mummert "Baby Vamp"
DH Ambulance (Air Service)	Sopwith "Camel"
DH Air Mail	Sperry-Jennie
DH6	SVA9

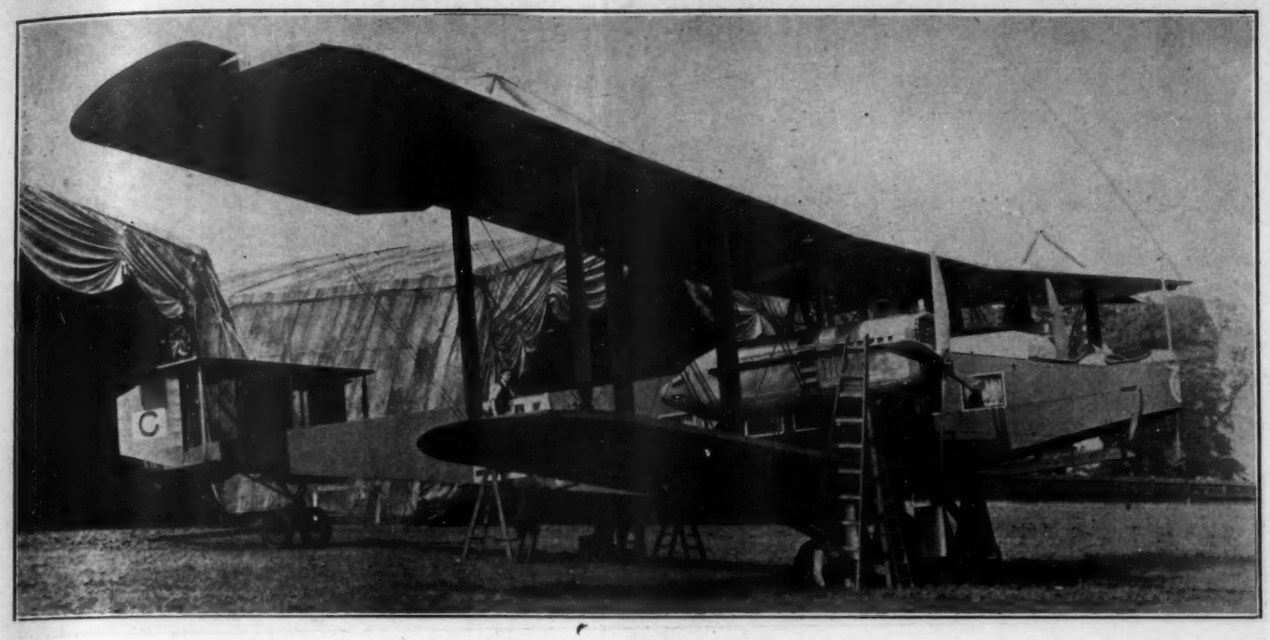
Aerial view of the establishment of the Curtiss Aeroplane and Motor Corp. at Garden City, N. Y., and of Curtiss Field

Among Those Present

Among those present were Maj. Gen. Mason M. Patrick, Chief of Air Service; Col. H. M. Hickam, Chief of Information Group, A. S.; Col. Paul Henderson, Chief of Air Mail Service; Senator Calder of New York; Col. Harold H. Hartney, still limping from his crash in the last Pulitzer Trophy Race, but greatly improved; Glenn H. Curtiss; C. Roy Keys; Frank H. Russell; Glenn L. Martin; S. S. Bradley; Carl Egge, Superintendent of Air Mail Service; Howard Scholle; Ralph Upson; James B. Taylor; Grover C. Loening; E. MacShayne; Chance M. Vought; Richard Hoye; Col. Benjamin Castle, just elected chairman of the Contest Committee, Aero Club of America; Charles Lawrance; Charles F. Redden; Leonard Bonney; Guy Gilpatrick; H. B. Childs; Mr. Caldwell; Laurence Driggs; Raymond B. Ware; B. D. Thomas; John Cautley; Comdr. Holden C. Richardson, U.S.N.; Col. W. C. Gillmore, A.S.,; Capt. Reuben Fleet, A.S.; Lorillard Spencer; Luther K. Bell; Howard Mingos; Paul G. Zimmerman; Augustus Post; L. D. Gardner; H. C. Mummert; Beckwith Havens; Lansing Callan; L. d'Orey.

The meet started with formation flying, carried out by six DHM's of the Air Mail Service and three DH4's of the Army Air Service. The latter came over from Mitchel Field and gave a most impressive display of the close formation flying taught in the Air Service, the three machines at times swooping low over the field with not more than 10 ft. between their respective wing tips. The Air Mail DH's, closely following their leader, from whose rudder a long pennant was streaming, also gave an excellent demonstration of the great skill and judgment of the mail pilots. Their evolutions, now breaking up a formation, then rushing into line again, was a very pretty sight with the sun playing on the veneer covered fuselages.

Assistant Postmaster Henderson, while watching the performance, announced that, probably, during this summer,



The Handley Page 0400T passenger-carrier (two 375 hp. Rolls-Royce "Eagle" engines) which made its American début at the Spring Flying Meet

aerial night flying mail service between New York and San Francisco would be established.

"The Air Mail Service cannot be improved without night flying," he said. "I am at present at work, planning emergency landing fields across the continent at thirty-mile intervals. These fields will be lighted with beacons and flares, the latter turned on when a plane desires to land. The air mail planes will be equipped with radio directional finders and radio telephone."

A Big Passenger-Carrier

Next a Handley-Page model 0400T passenger carrier attracted the attention of the crowd. This huge machine, which was recently used on the London-Paris service and still carried its British nationality and registration marks (G-EAAF), far exceeded in size all other airplanes on the field, and when she loaded up a dozen passengers and took off, the public was greatly impressed by this demonstration of civil air transport. Later the Handley Page took part in an exhibition of aerial warfare, when she went up 5000 ft. and "bombed" Curtiss and Mitchel Fields, while various DH4's were diving down on her to beat off the attack.

While the Handley-Page 0400T gave New Yorkers their first chance of seeing a British air liner perform, a demonstration just as useful, though far less spectacular, was furnished by the numerous smaller passenger carriers, Curtiss Orioles and Jennies, Fokkers, etc. which were taking up passengers and bringing them down again with the casual air of so many Fords. As an illustration of the fact that air transport had actually arrived, and merely awaited the demand of the public, the joy rides carried out by the smaller ships were just as convincing as the flights of the big 0400T.

The Chief Events

Among the events scheduled was a landing to mark contest in which planes at 1000 ft. cut out their motors and landed with a dead stick at a specified mark, Milford Simms finished first, bringing his Jennie to a halt only 6 ft. 7 in. from the goal; Eddie Holderman, also in a Jennie, finished second, and Lawrence Sperry, in a Messenger, third.

The DH Ambulance of the Air Service which flew over Curtiss Field during the Spring Flying Meet, coming from Mitchel Field

The Curtiss "Cactus Kitten" racing triplane on which Bert Acosta reached a speed of 200 m.p.h. at the Spring Flying Meet

Another feature was the flying by "Slim" Lewis of the Curtiss pusher in which Glenn Curtiss won the first Gordon Bennett race in 1909 by attaining a speed of 43 m.p.h. The old plane was not only flown, but stunted too, and stood the treatment as well as a 1922 ship.

In an eight mile handicap race around the water tanks of Mitchel Field, Westbury and Mineola, John Miller, in an Oriole, finished first; Bill Gilmour, second, and A. Henriquez, in a Sopwith "Camel," third. Lloyd Bertaud, holder with Eddie Stinson of the world's duration record of 26 hr. 19 min. 35 sec., then took up the Mummert "Baby Vamp," probably the smallest plane in the world and made several laps.

In the meantime a Martin Bomber of the latest (MB2) model had come over from Mitchel Field and joined the aerial parade by making several circuits of the field. The big ship, with its merrily waving crew, gave a forceful impression of air power, although not many of the spectators knew that its type represented at the present moment the principal offensive element of the Air Service, and that it had been responsible for the sinking of the largest ex-German warships off the Virginia Capes, last summer. The sky at this moment was filled with airplanes of all descriptions, various SVA's, "Messengers" and a Sopwith "Camel" stunting around to the joy of the spectators, while the joy riding machines were carrying out more prosaic duties. Then a DH Ambulance came over from Mitchel Field and flew several times around the field, the spotless white color and red cross of the ship making it easy to identify. The Air Service thus showed that it was ready for all emergencies—although no cause was given for this precaution for there was not even a forced landing during the entire meet.

The "Cactus Kitten" in Action

Toward the closing hour a big thrill was given the public when Bert Acosta stepped out of the control cockpit of the Handley-Page, which he had just piloted, and climbed into the small seat of the Curtiss "Cactus Kitten." As will be remembered, this machine was flown last fall in the Pulitzer Trophy Race, at Omaha, by Clarence Coombs, who finished second, Bert Acosta winning the race on the Curtiss-Navy

The Curtiss Oriole—three of which were kept busy at the Spring Flying Meet carrying aerial joy-riders

racer. The "Kitten," with its silvery triplane wings and crimson body, made a striking appearance when Acosta took her off the ground as a bullet leaves a gun and brought her back over the spectators. The speed at which the little ship shot around the field was so evident even to laymen, that there was a chorus of admiring comment. "Bert" made three circuits and then came down, as he could not get all the "revs" out of his engine, but even so the speed of the "Kitten" was estimated at about 200 m.p.h. As no official timers were present, and the flight was not made over a kilometer course, as prescribed by F.A.I. rulings, no record could be established. The same morning Acosta had flown the "Cactus Kitten" at an indicated speed of 208 m.p.h., which gives him hope that when the engine is properly tuned up he will be able to beat the existing world's record of 205 m.p.h., made by Sadi Lecointe on a Nieuport-Delage "sesquiplane" last fall in France.

The closing event was a successful parachute descent made from a DH4 by Sergt. Joe Devlin, of the Army Air Service.

Altogether the Spring Flying Meet was a great success, the more so as not the slightest mishap marred it. The large attendance showed beyond doubt that, given an interesting program, New Yorkers will patronize a flying meet in sufficient numbers to make its organization worth while. It is to be hoped that more meetings of this kind will take place during the flying season in the neighborhood of New York, for by showing the not-yet-flying public the safety and reliability of airplanes a valuable educational work is performed.

Santa Maria Safe

On April 25 it was announced that the Aeromarine Airways flying boat Santa Maria, pilot E. Musick, carrying three passengers and a mechanic was missing. The boat had left Key West at 6 a.m. the previous day en route for Nassau, Bahamas, a distance of 350 miles, and when she failed to arrive at the latter place a general search was organized by naval seaplanes and flying boats of the Airways.

The "lost" flying boat was finally located on April 26 at noon by a naval F5L flying boat in command of Captain Bartlett, USN, who found the Santa Maria peacefully beached on the shore of a little bay on Williams Island, two miles south of Andros Island in the Bahama group. All six persons on board the Santa Maria were reported safe and well.

According to the pilot, the Santa Maria had encountered unusually heavy winds on her trip out of Key West, and in bucking them the gasoline supply was running low, so that the pilot decided to come down at Williams Island. Having sighted a small harbor he made a safe landing at 1:30 p.m., taxied up to the beach and awaited gasoline which he knew would be sent out by the relief boat. In the meantime, the passengers amused themselves strolling up and down the beach and preparing a good dinner from the supply of rations aboard the ship.

As soon as possible the passengers were transferred to a fishing schooner and taken on to Nassau. When the Navy flying boat located the Santa Maria they sent out a wireless stating where she was located, then made a landing and supplied the air express with sufficient gasoline and she continued on her course to Nassau.

In this connection it is well to point out that the Aeromarine Airways, which operates a fleet of flying boats between Florida and points in the Bahamas and the West Indies, have to date flown over a total distance of 150,000 miles, and have carried over 10,000 passengers without a single serious mishap.

Likewise it was an Aeromarine HS flying boat in which Ewing Easter made the survey of seaplane facilities on the Atlantic coast, printed in our last issue.

The Aeronautical Chamber of Commerce points to the safe arrival at Nassau of the air express Santa Maria as another indication of the safety of over-water air transport when conducted by a company sufficiently well organized and financed to maintain their equipment in the best possible condition.

In commenting on the experience of the Santa Maria, C. F. Redden, president of the company said: "We did not have the least apprehension for the safety or even the comfort of the passengers on the Santa Maria because the boat is as much in its element on the sea as it is in the air. The boat, an eleven-passenger cabin cruiser, always carries sufficient food and water to maintain its passengers for a week should the boat have to make a forced landing. Our system of rigid inspection and maintenance has enabled us to operate successfully for two years without serious trouble and the wonderful record of these flying boats in the service of the United States Navy is an eloquent testimonial to their sea and air worthiness and general reliability."

The Santa Maria will leave Nassau in a few days for Washington and New York where it will be placed in regular service between New York and Atlantic City.

Book Review

THE AIRPLANE ENGINE. By Lionel S. Marks, M.M.E., 454 p. p., illustrated with charts and drawings published by McGraw Hill Book Co., Inc., New York, 1922.

As stated by the author, this book attempts to formulate existing knowledge of the functioning of the airplane engine, and to present and discuss the details of those engines whose excellence has resulted in their survival.

The book consists essentially of a well selected compilation of reports issued since the war by the Engineering Division, U. S. Air Service, the National Advisory Committee for Aeronautics, the Bureau of Standards, and by the corresponding British, French and German technical organizations. In addition to this, the author has included the standard theories and formulae on internal combustion engineering in well arranged form.

The opening chapter presents the fundamental theory of flight in its simplest terms, discussing particularly the power requirements of the airplane.

The chapter on Engine Efficiencies and Capacities is particularly complete, much data being quoted, mostly from British reports, on the effect of various factors such as mixture strength, compression ratio, etc. on engine performance. This is in addition to the usual theories of combustion and efficiency.

Chapter IV on Engine Dimensions and Arrangements contains the usual more or less unsuccessful attempt to tabulate accurate data on all existing airplane engines. Many of the newest models are not included, presumably due to lack of information when the volume went to press. In the discussion of "those engines whose excellence has resulted in their survival", one is disappointed at the inclusion of the King Bugatti, a signal failure, and at the omission of two of the latest German engines, the B.M.W. and the 200 hp. Benz.

The discussion of materials might be more complete, in view of the scarcity of reliable information on this subject from American sources, but nevertheless is of considerable value.

The chapters on engine details, valve gears, radials and rotaries include rather complete presentations and discussions of present practice. The chapter on fuels is also quite complete, but one regrets that the data are obtained principally from British sources, and very little mention is made of the work of such American investigators as Thomas Midgeley and H. L. Horning.

Chapter X on carburetors is almost entirely a summary of National Advisory Committee researches at the Bureau of Standards, and, therefore, represents some of the most up-to-date information on this subject.

The remainder of the book consists of brief chapters on Fuel Systems, Ignition, Lubrication, Cooling, Reduction Gears, Supercharging, Manifolding and Starters. The discussion of Cooling is quite complete and gives considerable data from Dr. Gibson's British experiments on Air Cooling not hitherto generally available in this country.

In spite of the fact that "The Airplane Engine" suffers considerably from the author's lack of intimate contact with present developments in aviation engines, it is without doubt the most scientific and dignified work on the subject which has yet been produced by an American author, and as such deserves a place in the library of all those interested in aeronautics.

Forest Mapping and Estimating from the Air

Brief Account of an Aerial Timber Survey Carried Out in the Canadian Woods by a Crew of Four Men

By Elwood Wilson

As foresters generally have shown much interest in the use of aircraft and aerial photography for making forest maps and estimates, reconnaissances and so forth, it was thought that a description of a survey as actually carried out in Canada might be of interest.

Site of Operations

The area about which information was wanted was situated 102 miles in an air line from the air station and about 24 miles from the railroad, 16 over a wagon road, and the remainder by water. A site was selected for a base, and an air engineer, a cook, camp equipment and seventeen drums of gasoline were sent in by wagon and boat. Two tents were put up, one for sleeping quarters and the other for a mess tent. This was on the shore of a bay, and the site selected for an anchorage was sheltered from all winds, and the water was deep enough to bring the nose of the plane up on the sand without endangering the hull. The beach was sandy and flat, and by a little easy digging a small channel was formed into which the plane could be drawn so that the engineers could easily get at the rigging and engine, and also refuel.

The crew consisted of Pilot Maxwell, Forester-Photographer Townsend, Mechanic I. Vachon, and Rigger Hyde. The machine used was a Curtiss HS2L flying boat G-CAAD.

Previous to beginning the work, the chief of party of another survey crew, which was engaged in a survey and estimate of a 50 square mile tract about 54 miles south of the above base, was taken for a flight over the territory on which he was to work. He flew twice over the area with a map on which he made notations of the general lay of the land, the types of timber, and so forth, and this information proved of the greatest value in carrying out his survey.

The plane was moored out in the open during the duration of the survey, and in spite of rain, snow, and hail, suffered no damage and was continually on the job. Trips were made on cloudy and rainy days, and photography was carried on in winds up to 50 m.p.h. The boats used have been in commission for four seasons, and will be used again this year, showing that there is a reasonable life for aircraft.

Reporting Forest Fires

One interesting side line of this work was the discovery and reporting of forest fires. On Sept. 1, a fire was sighted 18 miles away from the plane at 7.30 p. m. and the plane landed at the nearest telephone station and reported it. It is practically certain that the ground patrol would not have discovered the fire at this time of day, and it would probably have assumed quite large proportions before being discovered the next day. Another fire was reported on Sept. 3, and on Sept. 8 a report having been received that a fire had occurred on a certain lake, the plane was sent to investigate, and reported that there was not, and had not been, any fire. On all flights reports were made of fires burning, and areas already burnt were sketched and sent in to headquarters. Sketches made from the air were afterwards checked on the ground, and found to be almost as accurate as to areas as the ground surveys.

The total time spent in photography was 12.8 hr., and the area mapped was 140 square miles. This shows a performance of 10.8 square miles per hour of useful photos. The work was done at, as nearly as possible, an altitude of 5000 ft., which gave plenty of detail for the interpretative work. In making a mosaic it is necessary to have the pictures overlap on all sides, and this was found difficult in high winds, but in ordinary weather it went well. The photographer directed the pilot on his course by hand signals, and there was perfect cooperation between the two. No reconnaissance flights were made strictly for that purpose, but in test flights a considerable amount of reconnaissance work, sketching, and oblique photography was carried on.

There was already an accurate map of the water courses and lakes on the area, and when the photographs were finished the areas in the various timber types were transferred to it and the areas planimetered. The ease with which these could be read from the photos, and their boundaries ascertained was remarkable. The types were divided as follows: coniferous, containing eighty per cent or over of conifers, spruce and balsam or jack pine, conifer-hardwood, containing 60 per cent to 80 per cent of conifers, hardwood-conifers, containing 60 per cent to 80 per cent of hardwoods, barren, heath or treeless swamp and second growth, where young timber was coming in after burns. It was seen on the pictures that there were very many places where blow-downs had occurred running from one to fifty acres or more. Most of these would not have been discovered by a strip survey with the strips located a quarter of a mile apart, but when their aggregate area was measured, it was found to be of importance. The percentage of the various types, as ascertained from the photographs, was as follows:

Conifer	35.7 per cent
Conifer-hardwood	56.1 per cent
Hardwood-conifer	2.4 per cent
Barren	0.4 per cent
Second growth	0.7 per cent
Water	4.7 per cent
Scattered blow-down	2 per cent of timbered area

How the Survey was Made

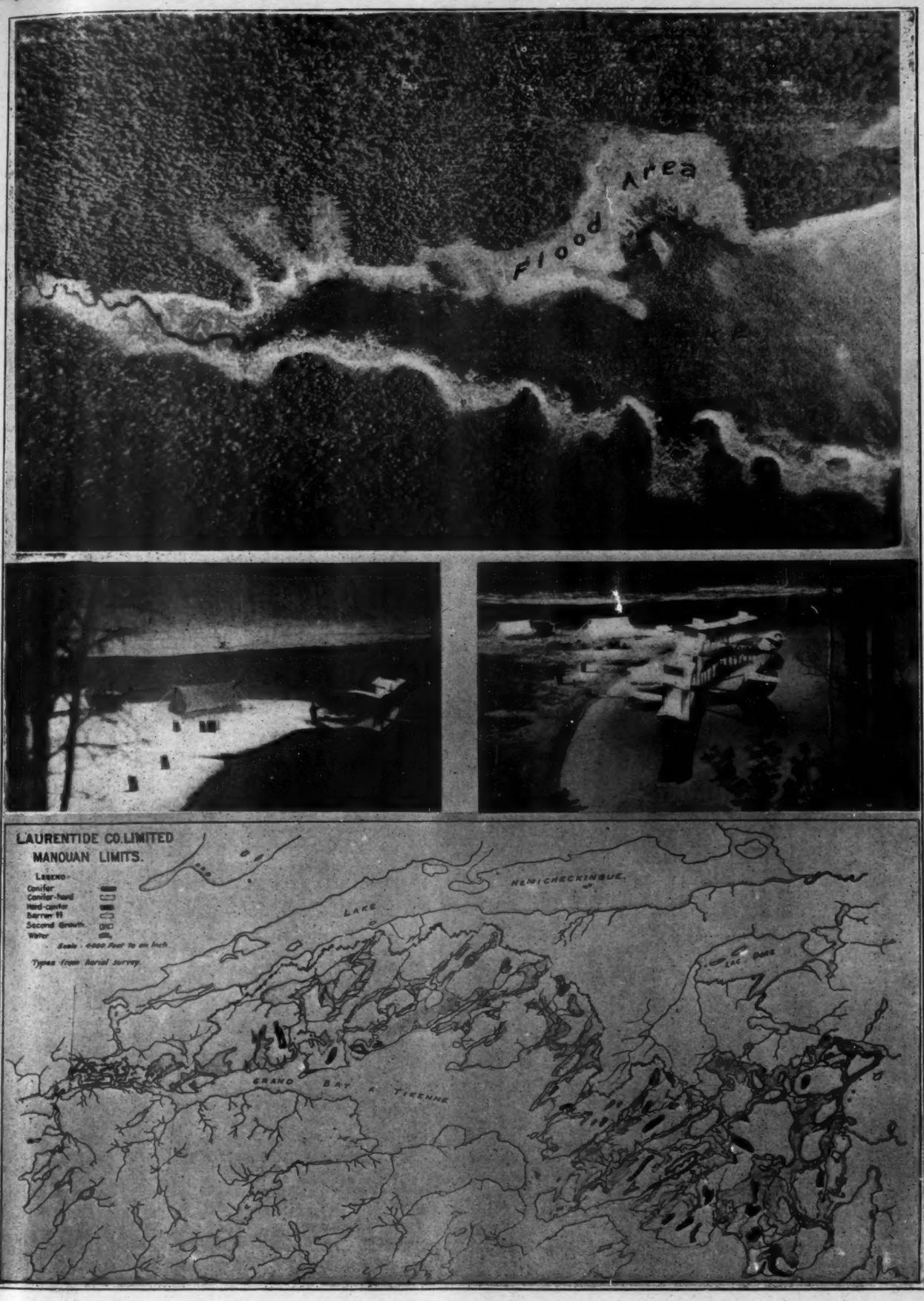
By comparing the photos with those taken in sections where the amount of timber per acre had been carefully determined an approximate estimate of the timber was made, and sample plots for ground study were picked out as representing fair averages of the stand. These plots have now been studied on the ground and check up well. There was no difficulty in locating the areas, picked out on the photos for study, on the ground and counts of the number of trees in quarter acre plots on the photos when checked on the ground came within two to four trees. The photos of these sample plots and full descriptions of the timber, number of trees, heights, diameters, condition, and so forth, have been mounted on cards and can be used for estimating other sections by comparison.

In the area under consideration, many balsam firs have been killed by the spruce bud-worm and other insects in the last five years. Most of the attacked trees are dead and down, and their loss has resulted in opening up the stand. This lessening of the density of stocking shows up well on the photos. Sample areas laid out on the photos and having the unstocked areas carefully planimetered showed an average loss of stocked area of about 28 per cent.

Cost Figures

I am, unfortunately, not permitted to give cost figures for this work for business reasons but I can state positively that if the latest costs for estimating the sample plots mentioned above are taken, and added to the inclusive costs for the airplane work, salaries, fuel, insurance, depreciation, making of pictures (all on a basis of all the winter costs included), the final cost will be $20.00 per square mile less than that charged by a large firm of consulting foresters for a big tract of land much more favorably situated and easier of access, and $30.00 less than figures of one of the large companies for work done in 1920.

The accompanying illustrations show several phases of the work, together with an aerial view of a flooded area and the finished map made from aerial photographs.



The photograph uppermost shows the river and part of the lake where water was raised and afterward lowered, also pure coniferous and mixed timber. The two photographs in the center show one of the bases, while the lower picture shows the finished map

Flight Testing Suspended Wings

Full Size Airplane Wing Suspended Below Airplane To be Shortly Tested in Flight at Langley Field

A full-sized airplane wing suspended below an airplane in high speed flight will shortly be tested at the Langley Field Laboratory of the National Advisory Committee for Aeronautics. This will be the first time that a real wing has been tested in actual flight, and is the final step of developing a new method of testing the performance and lifting properties of airplane wings.

This new method, developed by the N.A.C.A. and recently demonstrated successfully with model wings in air flights, consists in carrying the wing to be tested below an airplane in flight and, by means of suspension apparatus and recording instruments, to measure the forces of lift and resistance directly from the wing. The system was described in the Jan. 30, 1922, issue of AVIATION.

A complete airplane cannot be tested in flight as there is no means nor method of measuring the factors desired; there is nothing to suspend the plane from and its lift or pull cannot be measured by instruments carried on the plane itself.

Previous Systems of Testing

Heretofore tests of new wings have been made in one of the following manners: Years ago, Dr. S. P. Langley used a whirling arm which carried a small model of the wing at its extremity; the Wright Brothers and many others used the wind tunnel method which consisted in placing a model of the wing in a tunnel-like structure through which a draft of air was forced; later a method was devised for carrying a larger model of a wing above a motor vehicle or railroad car.

All of these methods, while giving interesting results, have been found lacking in the accuracy desired in the design of airplanes. The information available to a designer should be sufficiently accurate to enable him to predict the ultimate actual performance of a wing on a full-sized airplane. In the whirling arm and the wind tunnel methods of test, errors were found to exist due to the small size of the model that could be tested; while in the method of carrying the wing above a vehicle, the interference of the ground and the wind was responsible for the inaccuracy. In short, the reason that no one of these methods proved entirely satisfactory is that the method and equipment used did not even remotely approach the actual conditions of flight.

It was with this in mind that the new method was evolved, in which every detail has been arranged so that the test conditions are as close to the conditions of actual flight as is possible. Under the new method a model wing is constructed to full size and the conditions of test as to speed and altitude of flight can be selected to suit the airplane in which the wing is intended to be used, and the qualities of its lift and resistance can be measured directly without an overburdening amount of mathematical calculation. In the preliminary tests of the new method using small models several difficulties were met and overcome and the results obtained are encouraging to the extent that the testing of full-sized wings is in preparation.

The New Method

The new method consists in suspending the wing to be tested upside down below an airplane in flight. It is supported by three steel wires at such a distance that there is no interference from the airplane or from the "wash" of its propeller. The wing is inverted so that the lift becomes a downward pull, keeping it away from the airplane, and the amount of the pull being equal to the lift when right side up. With the wing so suspended it is possible to measure its lifting force on spring balances directly through the suspending wires, and its resistance from the angle of these wires to the vertical. This, on its face, appears of little difficulty, but as it would be obviously impossible to leave the ground or to land with the model hanging below the airplane, it was necessary to take off with the wing hauled up against the plane and to devise a means of raising and lowering the model wing after the plane was in the air. It was in perfecting this apparatus that considerable difficulty was experienced, and twice while in flight the model got beyond control and broke away on one occasion, colliding violently with the tail surfaces causing considerable damage and threatening the destruction of the airplane in the air and loss of life to the test pilot and engineer. However, remedial changes were made in the apparatus and more careful handling of the wing has reduced this hazard to a minimum.

Originated by F. H. Norton

The method was originated by F. H. Norton, Chief Physicist in charge of aeronautical research at the National Advisory Committee's Laboratory, and the preliminary tests were carried out by him with the assistance of Thomas Carroll, Test Pilot of the Laboratory staff. Twenty flights have been made with the perfected apparatus carrying a model wing 6 ft. long by 1 ft. wide, and the results obtained have checked with remarkable accuracy with the known performance of the full-sized wing of similar proportions upon a full-sized airplane.

The testing requires calm air conditions to give the best results and the flight path must be in a straight line. For the purpose of demonstrating the possibilities of the method, however, several flights were made on days when the air conditions were far from ideal and turns made with the wing suspended. It is possible to vary the angle of the model wing to the wind by raising or lowering the rearward suspending wire and the angle is read, with the aid of a telescope, from a small inclinometer or spirit level attached to the model. As the model is carried from twenty to thirty feet below the airplane, it is necessary to reel in the suspending wires until the model is close up to the body before a landing may be attempted. It has been found that in gliding onto the field at customary speeds, forces are developed by the model which are nearly capable of tearing it loose. This has been easily corrected by approaching the ground at lower speeds.

Influence of Model Surface and Air Flow Texture on Resistance of Aerodynamic Bodies

N.A.C.A. Report No. 139

This report, by A. F. Zahm, is an analysis of the resistance equation

$$D = \rho L^2 V^2 f\left(\frac{VL}{\nu}\right)$$

It is shown that the expression $f\left(\frac{VL}{\nu}\right)$ applies only to a special case of uniform air flow and model surface texture. In order to obtain comparable results under various conditions it is necessary to use a more general form of the resistance equation, such as

$$D = \rho L^2 V^2 f\left(\frac{VL}{\nu}, \frac{1}{L}, \frac{\nu}{V}, \frac{V}{a}, \frac{V^2}{Lg}\right)$$

in which $\frac{1}{L}$ is a measure of the model surface texture and $\frac{\nu}{V}$ a measure of the air flow texture. These two functions have particular application in the comparison of tests from different aerodynamical laboratories.

Soaring Flight in French Guinea

Careful Observations of Irregularities of the Wind Show Regions of Soaring Flight Coincide with Ascending Winds

*By P. Idrac**

In the Notes published in the Reports of Oct. 20 and Dec. 8, 1913, I described the first part of our work on soaring flight. This work, interrupted by the war, was renewed in the latter part of 1919, thanks to an appropriation from the Service des Inventions.

The term soaring is here applied to the flight of certain large birds which maneuver in the air without moving their wings. Many theories have been evolved and published relative to this mode of flight. (See Cousin, Lanchester, Hankin, etc.) Of all these theories the only ones acceptable are those based on the utilization by the bird of the internal energy of the wind. In the particular cases studied in the above mentioned Notes the energy required for the support was supplied by an upward component of the wind. †

It seemed doubtful whether this is always the case, particularly so in the case of certain African plains, above which birds soar continually and over considerable distances. (See the famous observations by Mouillard in "L'Empire de l'Air.")

Studying the Irregularities of the Wind

New methods have been devised for studying the irregularities of the wind and the horizontal and vertical components of its velocity in those regions where the birds are flying. For this purpose we used the Service des Inventions anemometer kites which permit measurement of the speed and irregularities of the wind by means of a force indicator whose readings may be controlled by various means. Also, for the study of the vertical component, we used kites which carried a pivoted arm, the angle between which and the vertical was a function of the angle of the wing with the horizontal. This angle was determined from the ground by the use of a Rochon telescope and trigonometric calculations. This enabled us, knowing the velocity of the wind, to determine its vertical or horizontal components.

We also used, with some modifications, the sounding balloon method described in the above mentioned Notes. The balloon was adjusted to have a low ascensional velocity and a Rochon telescope was used instead of a camera in order to investigate conditions at greater distances and altitude. A complete study of the sources of error introduced by this method justified its use.

These different experimental methods permitted us to make aerodynamic investigations in the zones of the soaring birds. We worked particularly in the vicinity of Dakar and in Guinea.

Some Primary Facts

In these regions the wind nearly always has a vertical component, and if this vertical component were plotted over a horizontal plane at a definite height from the ground, positive areas (ascending currents) and negative areas (descending currents) would be noticed. Some of these areas remain fixed in position (being caused by natural obstacles) and the other areas move without apparent laws and due to undetermined causes.

The regions of soaring flight always coincided with the areas of ascending air. It is in these areas that the birds fly, either circling or following an irregular course. The birds move with moving areas of rising air and do not cross from one positive area to another except in approximately straight lines and without stopping. They might thus lose a little altitude with impunity which they would regain in the next positive area; this would at first sight give the impression that they sailed at random throughout the atmosphere.

We were unable to establish any connection between irregularities in the wind and soaring, soarability often occurring in a feeble and regular breeze.

These prime facts having been once established, and the upward component of the wind ascertained to be the cause of soaring flight, it is obviously possible, by repeated experiments, to determine the minimum upward component necessary to support the soaring bird. If, in addition, the absolute speed of the bird be determined trigonometrically, the velocity of the wind being known, the speed V of the bird relative to the air might easily be figured. From this we might deduce the lift/drag ratio which, as is easily seen, is equal to v/V, where V is the vertical component of the wind velocity. The lift, moreover, is equal to the weight P of the bird. If the lifting surface A is also known the coefficients K_y and K_x may be determined from the formulas

$$\text{Lift} = K_y A V^2$$
$$\text{Drag} = K_x A V^2$$

and various birds may be compared from the standpoint of their aerodynamic efficiency.

Some Preliminary Results

By this method the following approximate figures were derived. We hope to check them by more numerous and exact measurements and to include later all types of soaring birds.

Bird	V Relative Air Speed	v Upward Air Velocity	L/D	K_p K_z/m^2	K_t K_z/m^2
	m/sec.	m/sec.		m/sec.	m/sec.
Egyptian Vulture	7.5	0.5	15	0.06	0.004
African White backed Vulture	8.5	0.5	17.5	0.12	0.007

Bird	Relative Air Speed	Air Velocity	L/D	K_y lb./sq. ft. mi./hr.	K_x lb./sq. ft. mi./hr.
	ft./sec.	ft./sec.			
Egyptian Vulture	24	1.6	15	.0025	.00016
African White backed Vulture	28	1.6	17.5	.0049	.00029

These figures however are taken from a very limited series of observations, and we publish them only as a first approximation which we hope to confirm by continued research. Nevertheless they have thrown some light on the use by birds of the internal energy of the air, and, if not on the only form of soaring flight, at least on one of them, for we could not state without pursuing a new set of experiments that other birds have not other means of utilizing the internal energy of the air. Of particular interest in this connection is the albatross, which we hope soon to study ,and whose flight over the Southern seas evokes the admiration of the travelers and scientists who have had the opportunity to see it.

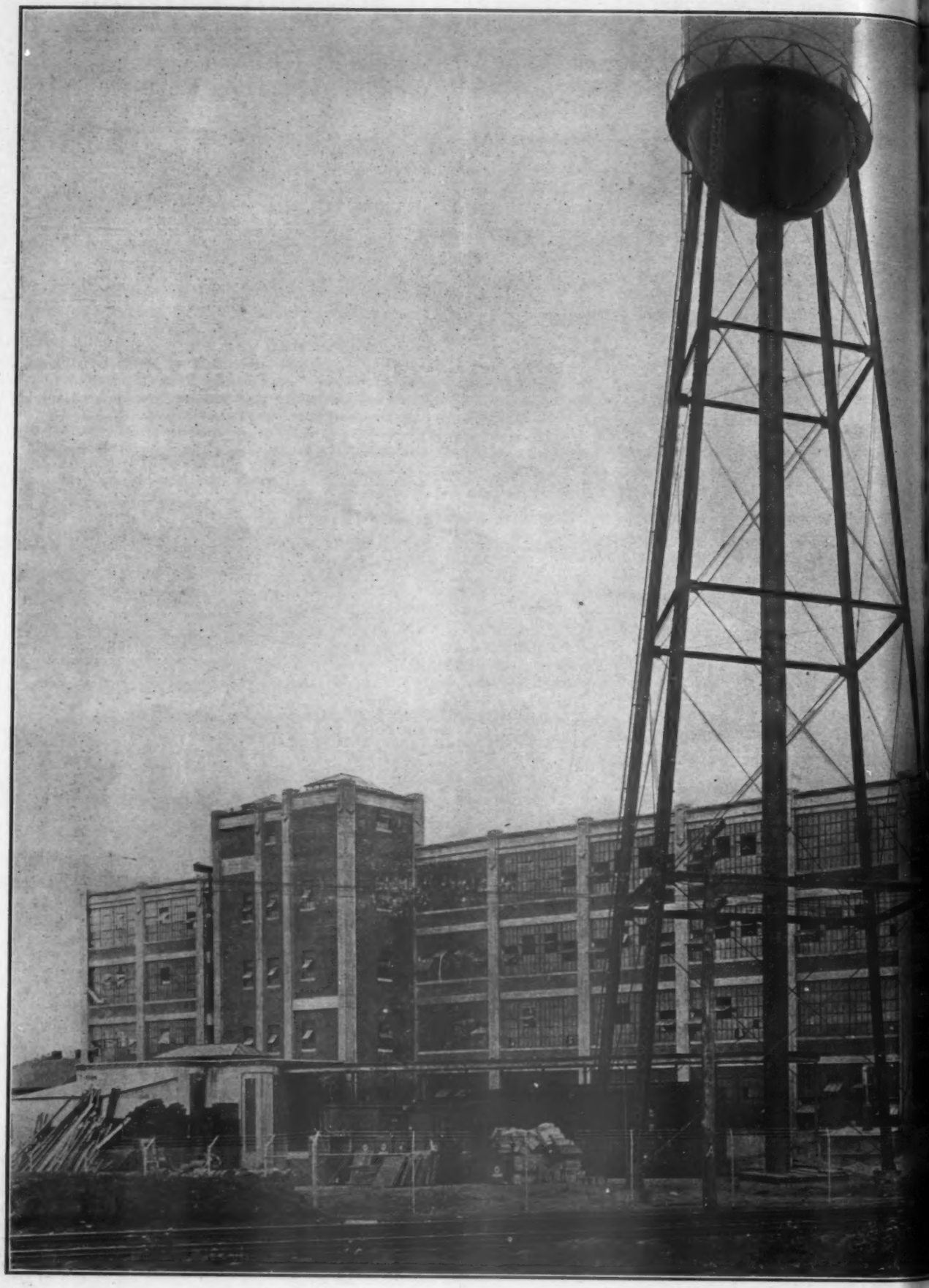
---

* Presented before the Academy of Sciences by M. Deslandres, Feb. 2, 1920. Translated from the French by D. L. Bacon, Assistant Physicist, Aerodynamical Laboratory, N.A.C.A., Langley Field, Va.

† Other forms of internal energy may be supplied by varying or turbulent air flow. (Translator.)

New Type of Wing

According to a London newspaper, a new type of wing has just been perfected after more than ten years of experimenting. The new wing is built with the object of increasing the lifting power of machines, and the first tests have been satisfactory. An airplane fitted with the new wing, seen from a distance, looks like a huge seagull with wing tips depressed. Instead of two rigid, horizontal straight planes, a single rigid plane is used, which from the center curves outward and downward to the tips. No fabric is used in the manufacture of the wing. Its surface is of mahogany veneer, thus making it better able to withstand all kinds of weather.



WHERE WRIGHT AERONAUTICAL ENGINES ARE MADE

ACREAGE. Approximately 7 acres, located on Main Line of Erie Railroad.

AREA. 90,000 square feet.

DESCRIPTION. Four floors, size 75 ft. by 300 ft. Concrete and steel heavy mill type construction, 250 pounds per square foot loading.

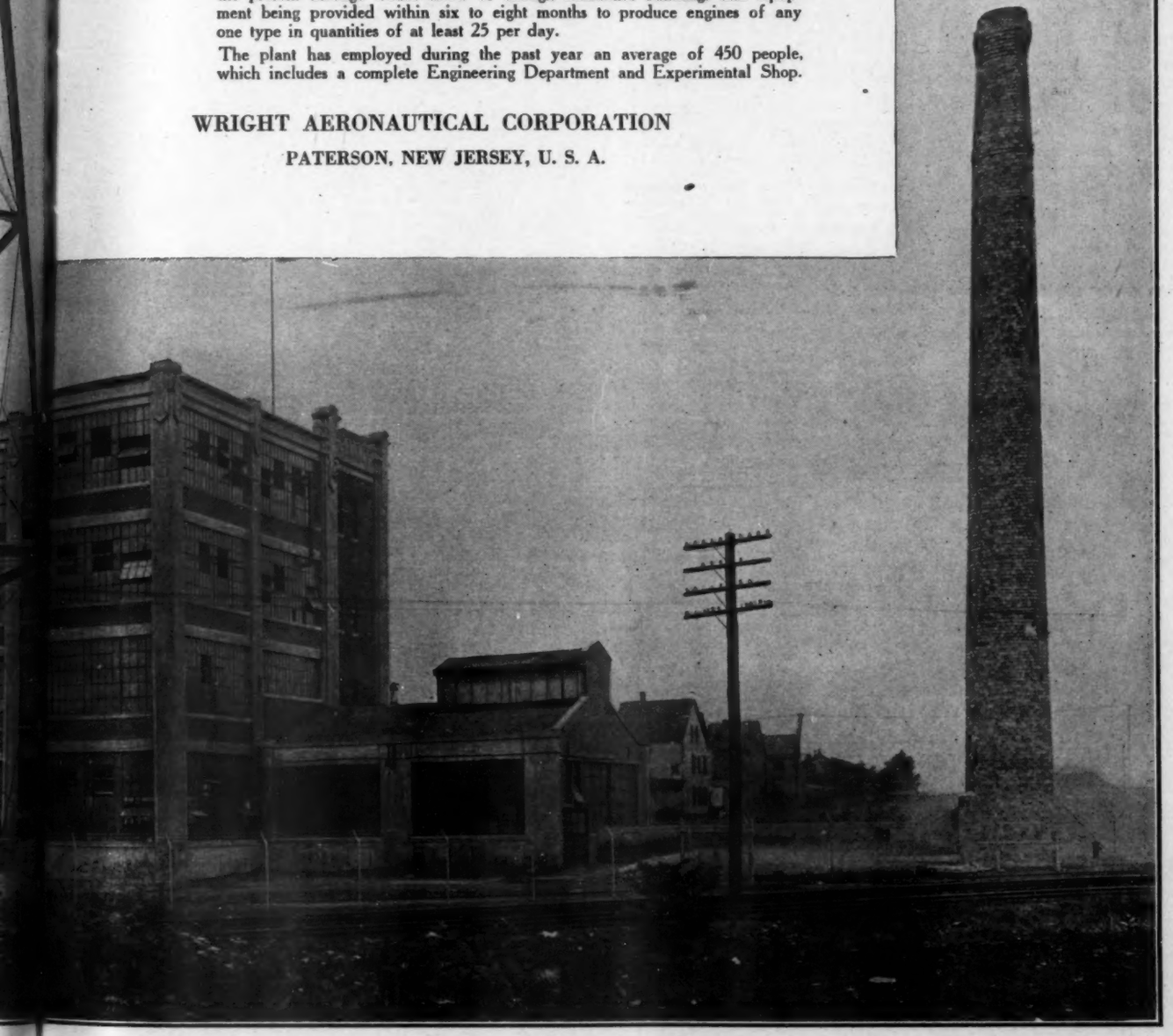
EQUIPMENT. The plant is equipped at present to produce, and is producing, approximately 300 engines per year, with spare parts therefore, and has ample capacity in addition to provide adequately for all spare part requirements for all types of engines previously produced. The equipment of the plant provides for the complete manufacture of various type engines produced, including bronze and aluminum castings, except bar steel and drop forgings.

The capacity of the present plant could be expanded to produce engines at the rate of five per day in the present building. In an emergency the present acreage would allow of enough additional buildings and equipment being provided within six to eight months to produce engines of any one type in quantities of at least 25 per day.

The plant has employed during the past year an average of 450 people, which includes a complete Engineering Department and Experimental Shop.

WRIGHT AERONAUTICAL CORPORATION

PATERSON, NEW JERSEY, U. S. A.



"Who's Who in American Aeronautics"

(Copyright, 1921, by The Gardner, Moffat Co., Inc.)

The biographical sketches of men who are prominent in American Aeronautics are printed periodically in AVIATION. The first series will be shortly published in a more durable form, and revised issues will be published semi-annually to take care of the frequent changes in station of Army and Navy officers, and such other changes as may occur. As errors and omissions are liable to occur in a compilation of this character, interested parties are requested to notify "Who's Who" Editor of the necessary corrections so the record may be kept up to date.

William Terrell Atkinson

ATKINSON, WILLIAM TERRELL, Railway Business; born, Florence, Tex., April 16, 1888; son of George C. Atkinson and Beatrice Atkinson; married, Essie Leah Peterson, May 4, 1918.

Educated: Public schools of Florence, Tex. and Georgetown, Tex.

Professional: 1906, with the Pacific Coast Steamship Co.; with the following railroads: New York Central, Lake Shore & Michigan Southern, Santa Fe, Pacific Mail Steamship Co., Union Pacific.

Aeronautical Activities: First took up aviation at the Richmond School of Aviation, Richmond, Calif. in 1914; entered the U. S. Air Service, Nov. 23, 1917; stationed at Fort Wayne, Detroit, Mich., Jan. 15, 1918 to Feb. 22, 1918; entered Ground School at Cornell University, Ithaca, N. Y., Feb. 23, 1918; Cadet, Camp Dick, April 1918; training at Carlstrom Field, Brooks Field and Rich Field; transferred to Love Field as Flying Instructor; discharged at Camp Travis, Aug. 1919; purchased Curtiss JN4D and carried passengers and did exhibition flying in and around San Antonio, Tex. for few months.

Flying Rating: Reserve Military Aviator; Aero Club of America Pilots Certificate; Civial Flying License from Joint Army & Navy Board on Aeronautic Cognizance.

Present Occupation: Clerk, A. T. & S. F. Railroad.

Address: Joy and Hickory Streets; home, 1228 Olive St., Kansas City, Mo.

Frank Milton Browning

BROWNING, FRANK MILTON, Automobile Business; born, Ogden, Utah, Oct. 17, 1897; son of J. E. Browning and Mary Browning.

Professional: Storekeeper, Browning Auto Co., Salt Lake City, 1915-1917; Assistant Manager, Browning Auto Co., 1919-1920; Manager, Browning Auto Co., 1920.

Aeronautical Activities: Cadet training and advanced training; 2nd Aviation Inst. Center, Tours, France, Aug. to Nov. 1918.

Flying Rating: Reserve Military Aviator, Nov. 1918.

War Service: U. S. Air Service, Aug. 1917 to June 1919.

Member: Utah Aero Club.

Present Occupation: Manager, Browning Auto Co., Ogden, Utah.

Address: 473-27th St., Ogden, Utah.

George W. McEntire

McENTIRE, GEORGE W., Capt. Air Service; born, Kansas City, Mo., July 7, 1885; son of William W. McEntire and Flora A (Miller) McEntire.

Educated: Kansas City High School; Drury College, Springfield, Mo.

Professional: Automobile Salesman.

Aeronautical Activities: Officer in charge of transportation, Fort Omaha, 1917-1918; Instructor, airship school, Langley Field, 1919-1920; O. I.C. Airship school 1921; supervising construction of airships, Goodyear, Akron, 1922.

Flying Rating: Free Balloon Pilot; Balloon Observer; Airship Pilot.

War Service: July 9, 1917 to Nov. 11, 1918.

Present Occupation: Captain, Air Service.

Address: McCook Field, Dayton, Ohio; permanent, 1108 Park Ave., Kansas City, Mo.

Claire K. Vance

VANCE, CLAIRE K., Air Mail Pilot; born, Logansport, Ind., June 30, 1897; son of Elmer J. Vance and Martha E. Vance.

Educated: Logansport High School; University of Illinois.

Aeronautical Activities: Enlisted A.S.S.C. Feb. 1917; overseas Dec. 1917 to April 1919; Instructor at Tours after flying photography over the American Lines for historical purposes; operating own plane, 1919; Air Mail Pilot, April to Aug. 1920; operating own plane, Aug. 1920 to Feb. 1921; Air Mail Pilot to date.

Flying Rating: R.M.A., Oct. 13, 1917.

Member: Aero Club of America; Air Mail Pilots Association of America.

Present Occupation: Air Mail Pilot.

Address: c/o Air Mail, Reno, Nev.

Albert Francis Zahm

ZAHM, ALBERT FRANCIS, Physicist; born, New Lexington, Ohio; son of J. M. Zahm and M. E. (Braddock) Zahm.

Educated: Cornell University, 1892; Ph.D., Johns Hopkins University, 1898.

Professional: Professor Mathematics and Mechanics, 1890-1892, University of Notre Dame; Associate Professor of Mechanics, 1895-1907, Professor 1907, Catholic University of America.

Aeronautical Activities: Delegate to International Conference on Aerial Navigation, 1893, 1900; Inventor of aeronautical appliances and research apparatus; author of more than 200 aerotechnical papers and reports.

Member: Philosophical Society, Washington.

Author: Aerial Navigation.

Present Occupation: Scientific Study and writing; in charge of Aerodynamical Laboratory of U. S. Navy.

Address: Construction Department, Washington Navy Yard, D. C.; home, Cosmos Club, Washington, D. C.

Clair Eugene Cheney

CHENEY, CLAIR EUGENE, Commercial Pilot; born, Greene, Iowa, Jan. 12, 1889; son of Frank B. Cheney and Florence B. Cheney; married, Mabel E. Knox, Dec. 27, 1911.

Educated: Public schools of Greene, Iowa; Coe College, Cedar Rapids, Iowa.

Professional: Farming 1912-1917; Garage owner and manager, Greene, Iowa, 1919-1920; civilian flying 1921.

Aeronautical Activities: U.S.S.M.A. Univ. of Ill., March 15, to June 15, 1918; Camp Dick, June 15 to July 6, 1918; Carruthers Field July 6 to Oct. 26, 1918; Brooks Field, Nov. 13 to Dec. 16, 1918; Instructor, Kelly Field, Dec. 18, 1918 to Jan. 15, 1919.

Flying Rating: Reserve Military Aviator, Oct. 26, 1918.

War Service: Dec. 15, 1917 to Jan. 15, 1919.

Present Occupation: Civilian flying.

Address: Greene, Iowa.

John Fulton Irwin

IRWIN, JOHN FULTON, Designer and Consulting Aeronautical Engineer; born, Alameda, Calif., June 10, 1892; son of John Irwin and Harmie (Fulton) Irwin.

Educated: Public schools of San Francisco, Calif.

Professional: Aeronautical Engineer; designer, builder and operator of aircraft since 1907.

Aeronautical Activities: Designed, built and flew gliding machines in 1907; designed, built and flew engined plane in 1908, since that time has been designing, researching, experimenting, constructing and operating aircraft to date; in 1912 designed and built one of the first tractor biplanes in this country.

Present Occupation: Designer and Consulting Aeronautical Engineer.

Address: Irwin Aircraft Co.; home, 1233 J St., Sacramento, Calif.

Frank LeRoy Nape

NAPE, FRANK LEROY, Physician; born, Carrollton, Ohio, Jan. 8, 1884; son of John H. Nape and Isabelle Nape; married, Ada Jacobs, June 7, 1919.

Educated: Carrollton High School, 1899; Cleveland College for Physicians and Surgeons, 1905; Cleveland Homepathic Medical College, 1907.

Professional: Began practice surgery and medicine, 1907 and continued to date.

Aeronautical Activities: Course in aeronautics in 1919 and built a plane which he uses in making calls on patients in nearby cities; aerial photography and advertising.

Flying Rating: International Pilot's License No. 4775.

Member: Canton Aviation Club.

Present Occupation: Physician.

Address: 1633 Navarre Road, S. W., Canton, Ohio.

James Frances Boyle

BOYLE, JAMES FRANCES, Engineer; born, New Haven, Conn., Jan. 19, 1892; son of James Boyle and Josephine (Schneider) Boyle; married, Gertrude Krooner, June 1920.

Educated: Public schools of New Haven; New Haven High School; Yale, Sheffield Scientific School, 1912.

Professional: Building Construction, 1911; Industrial Engineering and Scientific Management with Frank B. Gilbreth, 1912-1913 and 1914 in Germany; Industrial Engineering and Scientific Management with Benedict-Boyle-Stronck, Inc., 1914-1915; same in advisory capacity, 1915-1917.

Aeronautical Activities: Chief Engineer with Connecticut Aircraft Co., 1915 to 1920; Engineer and Pupil of Major Baldwin since 1915 in Lighter-than-Air Craft; Chief Engineer with Major Baldwin on the first Navy Dirigible, 1915-1916; Engineer on various dirigibles and balloons built for the Army and Navy during the war; at present designing and constructing kite balloons, towing airships, blimps and military airships for the Army.

Member: Member, Society of Industrial Engineers.

Present Occupation: Chief Engineer and Works Manager, The Airship Mfg. Co. of America (Lighter-than-Air), Hammondsport, N. Y.

Address: 48 Davis Ave., Hammondsport, N. Y.

Victor Vernon

VERNON, VICTOR, Commercial Pilot; born, Rome, Italy, Oct. 1, 1883; son of Leroy M. Vernon and Emily Parker Vernon; married, Charlotte E. Clay, May 18, 1911.

Professional: U. S. Army, 1902-1905; Office appliance salesman and district manager, various companies, 1906-1910; operated automobile agency, 1911-1913.

Aeronautical Activities: Flying training, bought and operated Curtiss F boat, 1913-1915; trained Canadians, Toronto, Canada, 1915; same, Newport News, 1915-1916; Chief Flying Instructor, Army, 1916-1918; inaugurated instructor's school, Gerstner Field; commissioned Lieut., U. S.N.R.F., April 21, 1918; experimental and test piloting for Navy at Washington and Philadelphia, April 1918 to May 1919; in charge of flying operations, Curtiss Corp., June 1919 to Dec. 1919; Oregon, Washington & Idaho Airplane Co., Dec. 1919 to date.

War Service: April 6, 1917 to Nov. 11, 1918.

Member: Aero Club of America; Aero Club of Oregon.

Present Occupation: Manager, Oregon, Washington & Idaho Airplane Co.

Address: 214 Spaulding Bldg., Portland, Ore.; home, Oswego, Ore.

Rex R. Stoner

STONER, REX R., 1st Lieut. Air Service; born, Sedqwick, Kan., Jan. 8, 1891; son of George E. Stoner and Stella Stoner.

Educated: Public schools of Westminster, Md. and New Market, Ia.

Aeronautical Activities: U.S.S.M.A. Berkeley, Calif., Sept. 8, 1917; overseas, Nov. 23, 1917; Instructor at Issoudun; 41 Squadron (Pursuit); 138 Squadron (Pursuit); U. S., Feb. 1919, Kelly Field; Laredo, Aug. 1919; Pope Field, Aug. 1920; Langley Field, May 1921.

Flying Rating: R.M.A., March 13, 1918; Airplane Pilot.

War Service: April 6, 1917 to Feb. 1919.

Present Occupation: 1st Lieut. Air Service.

Address: Langley Field, Hampton, Va.; permanent, 7411 59th Ave., Portland, Ore.

Frederick Harwood Norton

NORTON, FREDERICK HARWOOD, Physicist; born, Manchester, Mass., Oct. 23; son of Prof. Charles Ladd Norton and Francis Torrey Norton.

Educated: Public schools of Nashua, N. H.; B.S. M.I.T., 1918.

Aeronautical Activities: Aeronautical research at M.I.T., 1918-1919; with N.A.C.A. at Langley Field, 1919 to date.

Member: Amer. Physical Soc.; S.A.E.

Present Occupation: Chief Physicist, N.A.C.A.

Address: National Advisory Committee for Aeronautics, Langley Field, Va.

Seaplanes in Overseas Flights

The method used by the U. S. Navy for keeping track of the position of airplanes on overseas flights gives almost certain assurance against the loss of crews and passengers of planes and when salvaging facilities are available, the method also usually precludes the loss of planes.

All planes that make long passages are equipped with radio sets of sufficient capacity to communicate with a ship or station at the nearer end of the route of each flight in the passage. For example if the distance of the flight between ships or stations is a thousand miles, a radio set good for at least five hundred miles is required.

For any flight where there is a possibility of a forced landing in a locality on sea or land where there may be difficulty in finding the plane that is down, planes are never permitted to start a flight singly; they always go in pairs, and the two

Official Photo U. S. Navy

The kite of the Navy Emergency Seaplane Radio Transmitter, described in our issue of March 27, 1922

planes are mutually responsible for each other. The reason for pairing off this way is that in bad weather a plane may be forced to fly at such a low altitude that, even if it has a satisfactory radio set in operation, there may not be enough time between the instant of engine failure and the instant of landing for the radio operator to get a distress signal through.

With the planes paired off, when one is forced to land suddenly, the other circles it in the air and finds out by a visual signal whether his mate needs help or whether he will be able to make repairs in a few minutes and continue the trip. If the plane down is able to continue the flight in a few minutes, the plane in the air continues circling overhead, makes a radio report of the circumstances and, when his mate has taken off, reports that the flight is resumed. If the plane down must take a long time to make repairs or requires a tow to get into port, the plane in the air reports the circumstances by radio and then goes on alone to his destination. If the plane down makes no visual signal at all or signals that he is in need of immediate assistance, the plane in the air reports this fact by "rush" radio. After making certain the report has been received, he then lands—if landing is possible—to render assistance to his mate in distress. All these radio reports include the estimated postion of the forced landing and the time of their occurrence.

In addition to making reports of forced landings, the leader in each pair of planes makes a "postion report" at pre-arranged times in its flight usually these position reports for any pair of planes are at half hour intervals and consist simply of reports of the estimated distances made good on the pre-arranged course, with the times the reports are made; for example, "10 and 12 O. K. 450 at 1430" signifies that planes numbers ten and twelve were together on their prescribed route and had reached a point four hundred and fifty miles from their starting point at 2.30 p. m. The ship or station at each end of the route "listen in" for all position reports and as each is received, the numbers of the planes and the times of their reports are plotted on a chart at the reported positions along the line of the route. In this way the ship or station at one end of the route or the other end is aware of the positions of the planes from time to time, and in case of a forced landing is nearly certain to have prompt and close information on the locality to send assistance to.

In case of the very remote chance of failure of the radio sets in both planes of a pair simultaneously, or in case of the even more remote chance that both planes have a forced landing simultaneously, the information on the locality is not so close, but the last position report received will indicate the most favorable locality for search. For example say, planes "10 and 12"—proceeding at 80 m.p.h.—were reported "O.K." 450 miles on their course at 2.30 p. m., and were making position reports at half hour intervals; if no report is received from them at three o'clock, it is evident that the radio sets of both planes have failed or that both have been forced down somewhere between 450 and 490 miles from the start, and are somewhere close to the prescribed line of the route.

As all naval seaplanes carry pistols for firing colored stars and an ample supply of the stars, the area to be searched in a case like this is small enough to make it easy for a single ship to find the planes; as soon as it is dark the colored stars can be seen at a distance of 15 to 20 miles. In thick weather, of course, it is necessary to send more than one ship on the search, and the conditions are more difficult; but evidently they are very far less difficult than a search over the whole length of the route, which would be necessary when planes not equipped with radio make passages alone.

Human Factors in Flying

Few people realize that a small part of the inner ear has much to do with sea-sickness, and that this same portion of the ear affects the ability of a man to handle an airplane or airship.

Since the close of the war the National Research Council has had several projects centering on the studying of human factors in flying, involving "behavioristic" experiments on man and animals anatomical, physiological and psychological studies of the functions of the ear and associated eye movements; the writing of a history; and the collection of a complete bibliography on the subject. Last year the workers in this field came together and organized themselves into a committee on Vestibular Research for the purpose of encouraging and co-ordinating work in this field. This committee has formulated a project on "The Experimental Study of Habituation to Rotation," which has been approved by the National Research Council. This project forms a natural nucleus around which may be gathered data from field experience, clinical records of fliers, etc.

The project will be administered by an executive committee, at the present time composed of Dr. J. Gordon Wilson, Chairman, Dr. Raymond Dodge, and Dr. F. H. Pike, in co-operation with the Chairmen of the Division of Biology and Agriculture, Medical Sciences and Anthropology and Psychology in the National Research Council.

The Air Service is giving its active co-operation to the investigators through a special committee.

The National Research Council is now seeking to find some patrons who will be interested enough in this fundamental research to provide not less than $25,000 covering the research investigations of this committee during the period of two years.

Aeronautical Executives Luncheon

At the last semi-monthly luncheon of the Aeronautical Executives, held at the Café Boulevard on April 21, Major LaGuardia, introduced to those present by the Chairman, R. R. Blythe, spoke on the future of commercial aviation.

"The future of commercial aviation is merely a question of time" pointed out Major LaGuardia. "There is no doubt in my mind but that we are on the verge of a very great development in aeronautics. This, nevertheless, must come from within the industry itself. We cannot expect in the future large appropriations from the government to sustain orders for planes and engines, and thereby tide the industry over to better times. As time goes on the government orders will be decreased, and the aircraft budget will be cut to a minimum.

"During the war when the government took over the railroads there was a great deal of criticism for the Administration, but few people realized that the government agreed to pay 5 per cent interest on all the railroad's funded debt. In this, to a great extent, was the government railroad deficit increased. Now, just as the railroads were taken over in the past so will they be again in the future owing to the fact that slowly the interest on the railroad debt is mounting up and it is becoming increasingly harder to operate at a reasonable cost. When freights become excessive, the government will have to take a hand; the waterways of the United States will be utilized for slow freight, trains for regular freight, and aircraft for express.

"Passenger carrying", said Major LaGuardia, "is the least renumerative of any form of transportation, as it incurs greater expense for improved facilities, and more space than express or freight. It, therefore, remains with the executives of the industry to bring about a more rapid development by securing government mail contracts and cater to fast express. Time and confidence will bring the passengers to our central air depots."

In conclusion Major LaGuardia expressed the hope that the means would be found to stamp out fraudulent aircraft promotions and retain the confidence of the investing public.

Surplus MF Flying Boats

Fifty-seven MF flying boats, all that remained of the Navy's surplus stock, have been purchased by the Cox-Klemin Aircraft Corp. of College Point, Long Island. These boats are said to be in good condition, and the majority of them have never been uncrated.

They are being sold by the Cox-Klemin Corp. on three plans: without engine; with 100 hp. Curtiss OXX6 engine, completely tuned up and ready for flight; or reconverted to a 3-seater with 150 or 180 hp. Hispano Suiza engine.

The firm announces that flying instruction on a purchaser's boat will be given at a nominal figure.

The first purchaser of one of this lot of MF boats with 180 hp. Hispano Engine is a Detroit speed boat builder. With the owner as a passenger and Capt. T. L. Tibbs as pilot the ship was flown from College Point, L. I., to Detroit via the Hudson River, N. Y., state barge Canal and Great Lakes.

The Background of Detonation

N.A.C.A. Technical Note No. 93

The tendency of a fuel to detonate often renders it unsuitable for use in high compression engines. Detonation appears to be closely related to the explosion pressure and this depends upon the temperature and pressure of the charge before combustion.

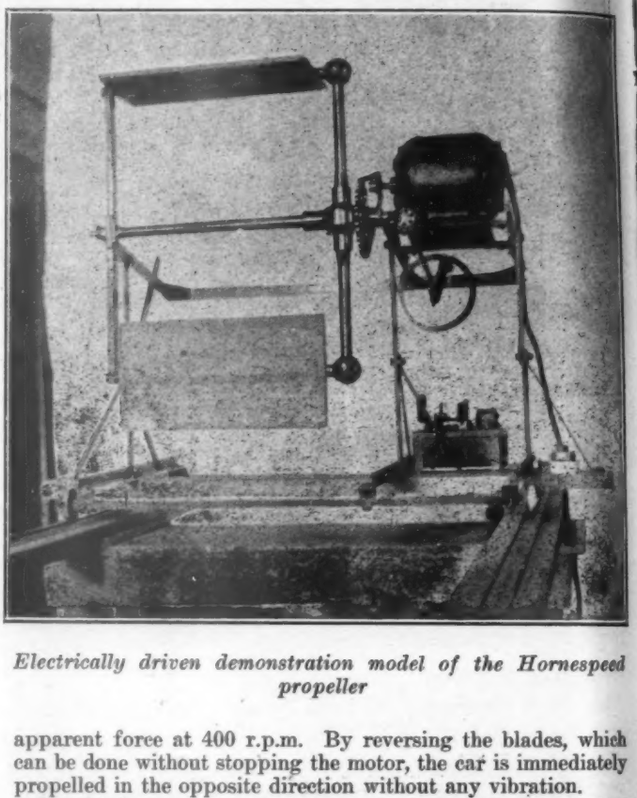
This paper, by Stanwood W. Sparrow, Automotive Power Plants Section, Bureau of Standards, discusses the influence upon explosion pressures and hence upon detonation of changes in compression ratio, spark advance, compression pressure and degree of scavenging. Consideration is given to the loss in power entailed by various methods of eliminating detonation. Preignition is shown to be another obstacle to the use of high compression ratios and its influence is compared with that of detonation.

The Hornespeed Propeller

A two-bladed, reversible propeller said to be suitable for air or water service and known as the Hornespeed propeller, was recently demonstrated before a representative body of Army and Navy fliers and engineers in the Office of the Chief of Army Air Service.

This invention, the property of James A. Horne of Denver, Colo., was operated in demonstrative form by Mr. Horne himself. Mounted on a light metal frame which rolled on a temporary track, the propeller was driven by a small electric motor developing 1/3 hp., which was of considerable weight in consideration of the ratio of a higher horsepower engine. For this reason, the operator explained, no attempt was made to lift the demonstrating model.

The propeller operated on a horizontal axis, like an old fashioned paddle wheel, but carried only two blades, the pitch of which is changed as the wheel revolves so as to give maximum power at the proper moment as well as minimum resistance when in a returning or negative position. When operated forward the light car was carried along the track with



Electrically driven demonstration model of the Hornespeed propeller

apparent force at 400 r.p.m. By reversing the blades, which can be done without stopping the motor, the car is immediately propelled in the opposite direction without any vibration.

The blades are also readily set in a position which gives lift to the plane of aircraft and this was demonstrated to some extent by holding the opposite end of the metal arm carrying the propeller, which proved difficult to hold down when the lifting force of the propeller was operating.

Mr. Horne claims that his adjustable and reversible propeller will lift a flying machine straight up, enabling it to hover, go forward or reverse, without stopping or reversing the motor. He also claims that by the aid of this propeller, flight within ten feet of the ground at a rate of speed not in excess of ten miles an hour can be maintained, while at higher altitudes very high rates of speed can be secured.

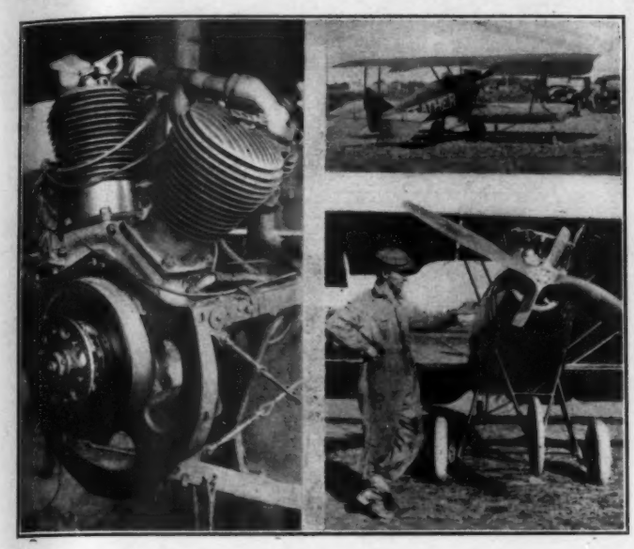
The inventor believes that his propeller will drive any vessel afloat considerably faster than a screw propeller, and that it can be reversed at full speed without changing gears, stopping the motor and without jar, was demonstrated on the model exhibited. As a fan blower, he says, the propeller will disturb more air than any other type known.

Among those witnessing the test were Maj. Gen. Mason M. Patrick, Rear Admiral Moffett, and other officers of the Army and Navy, and Frank H. Russell, general manager of the Curtiss Aeroplane & Motor Corp.

An Interesting Sport Plane

In view of the interest which attaches to the design of small single-seater sport planes fitted with a sturdy and economical engine of low power, the following information on the Heath sport plane, which is illustrated herewith, will prove of interest.

This machine was built by the Heath Airplane Co., Inc., of Chicago to furnish a demonstration that a workable airplane can be designed around a motorcycle engine, which the fact that the little ship has been flown with success demonstrated. As may be seen from the illustrations, the Heath sport plane



The Heath single-seater sport plane and its remodelled 20 hp. motorcycle engine

is built along conventional lines in the form of a tractor biplane. The engine a 20 hp. Thor model 15A, was rebuilt for this purpose with specially heavy gears and other refinements, the gear reduction being 3½ to 1. The two small blades of the propeller answer the purpose of increasing the slip stream over the cylinders and so giving the latter increased cooling. This propeller is, however, only used in the summer months, for during the cool weather a regular two-bladed propeller, 6½ ft. in diameter and 5½ ft. pitch is employed. The engine turns at 3000 r.p.m. in the air and the propeller at 1050.

Following are the characteristics of the Heath sport plane:

CHARACTERISTICS OF THE HEATH SPORT PLANE

Span	24 ft.
Overall length	18 ft.
Maximum height	6 ft. 6 in.
Total wing area	165 sq. ft.
Incidence	4 deg.
Chord	4 ft.
Gap	4 ft.
Stagger	15 deg.
Dihedral (lower)	1½ deg.
Engine and hp.	Modified Thor 2-cyl. 20 hp. motorcycle engine
Control Areas	
Ailerons	20.0 sq. ft.
Horizontal stabilizer	5.0 sq. ft.
Elevators	7.0 sq. ft.
Vertical fin	2.5 sq. ft.
Rudder	4.0 sq. ft.
Weights	
Weight empty	350 lb.
Useful load (incl. fuel)	200 lb.
Weight loaded	550 lb.
Wing loading	3.25 lb./sq. ft.
Power loading	27.5 lb./hp.
Performance	
High speed at 2000 ft.	60 m.p.h.
Low speed	29 m.p.h.
Climb in 1 min.	800 ft.
Service ceiling	5000 ft.
Full speed range	55 miles

Canadian Airharbors

The Air Board, Ottawa, Canada, notifies that Airharbor License No. 32, issued Aug. 13, 1920, to G. H. Harrold, Deseronto, Ont., for a public customs airharbor located 3½ miles W of Deseronto, Ont., has been cancelled.

Aerial Lighthouse, College Point

American Airways, located at College Point, L. I., announce the establishment of a high-powered searchlight which is to be maintained as an aid to aviators. The light will be a 14-in. lens Navy type, and will be thrown at an angle of about 50 deg. elevation, pointing due North. The character of the light, whether a flashing or fixed beam has not yet been decided by the Harbor Commissioners of New York. Announcement of their decision will be made in a later issue.

The light will be visible from sunset to midnight every night, as there are always a number of late flyers coming in down the sound during the summer months. The base of American Airways is always available for itinerant craft, and mooring and watchman service are available, in addition to regular "aerial garage" service, such as emergency and permanent repairs, overhauls, etc. The base is equipped to do work of whatever character may be required, being completely equipped.

American Airways have recently been made Curtiss representatives and maintain several machines for demonstration and joy-ride purposes. Experimental work is also going forward on a patent contracting wing, and an all metal amphibian scout.

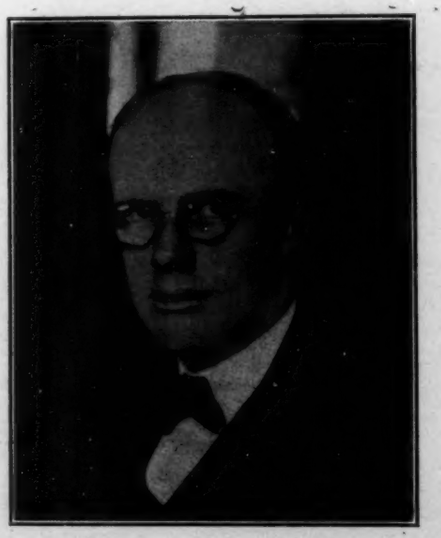
The Training School for Airplane Mechanics is continually getting new students and those who have been here for some length of time are becoming most proficient in their work. Several ships have been rebuilt this spring, and several others sold. A large number of applicants for the Pilot Training Course were recently received.

Curtiss Activities

The present Buffalo plant of the Curtiss Aeroplane & Motor Corp. on Churchill Street has about 200 men working on the manufacture of details and the assembly of parts for an order for 385 hp. pursuit type engines, lately designed by this company.

The Churchill Street plant is a complete airplane and motor manufacturing plant, containing all the machinery and equipment necessary to manufacture the details and conduct the assembly of present day types of airplanes and aeronautical motors. The airplane part of the plant is at present leased for other types of manufacture.

The New Air Mail Chief



Paul Henderson, appointed 2nd Assistant Postmaster General in charge of Air Mail Service

ARMY AND NAVY AIR NEWS

Air Service

Langley Field—The loss of the airship Roma created quite a void in the big lighter-than-air hangar at Langley Field, Va., and, to compensate for its loss an English Mullion type airship was inflated about three weeks ago and has since been operated quite extensively. It is being used for the training of cadets in the piloting of two-man control airships.

The Mullion type airship was developed by the British in 1918 for use as a short range coastal patrol ship. It is fitted with two 75 hp. Rolls-Royce "Hawk" engines, mounted above the stem of a streamlined car and driving pusher screws. The envelope has a capacity of 100,000 cu. ft., and measures 165 ft. in length, 49 ft. in height and 35 ft., 6 in. in diameter. While the theoretical full cruising speed is 57.5 m.p.h., the airship officers who have flown this ship at Langley Field state that it is the fastest airship in the United States today. On several occasions it is claimed that a speed in excess of 61 m.p.h. has been achieved.

This ship is very trim and neat in appearance, and offers considerably less resistance to the wind on account of the construction of suspensions, and the shape of the bag itself. It has the customary two ballonets and trims very nicely. It is reported, however, that the directional controls do not function as decisively and promptly as would be desirable. This is no doubt due to the fact that there is no top tail surface. All directional stability is taken care of by a lower tail surface to which the rudder is attached, and this results in a slight amount of rolling. On altitude control the ship behaves excellently and promptly. The car is light and well designed. Four or five passengers can be carried, although she functions better with only four passengers.

Shortly after the Armistice the War Department purchased several of this type of airship. The first one was inflated at Langley Field in 1919, but was destroyed when the temporary hangar blew down. Since that time A, C and D type of ships have been operated for experimental purposes, and this is the first time a Mullion has been put in the air.

The Mullion is also called the S.S.T., which stands for "Submarine Scout Twin," being motored with two engines. This type of airship performed flights of considerable duration for the British Navy and were used for locating and bombing of submarines. Quite a few German submarines were destroyed through the agency of this airship.

* * *

Ellington Field—A report from Ellington Field, Houston, Tex., is to the effect that, so far as known, the fastest cross-country flight between Ellington Field and Kelly Field was made by Lieut. R. T. Aldworth in an MB3 on April 1. The duration of the flight westward was 1 hr. 23 min. (151.8 m.p.h.) The distance between these two stations is 210 miles.

The 1st Group (Pursuit) at Ellington Field is rapidly being equipped with Spad and MB3 planes. It is planned to have enough MB3's assigned to the squadrons to equip each officer of the Group with a plane in prepartion for the forthcoming annual tactical training operations to be conducted during the latter part of June.

* * *

Clark Field—Lieut. R. Baez, Jr., gave the garrison at Clark Field, Pampanga, P. I., and not a few visitors, a thrill when he made a night flight for the purpose of testing out the new flood lights recently installed on the hangars for emergency use. Lieutenant Baez remained in the air for an hour, during which time he flew over the encampment of troops located several miles northeast of the field and Camp Stotsenburg proper. A perfect landing was effected, but due to the rough field a shock absorber was broken, without mishap, however.

Mather Field—The entire class of flying cadets assigned to Mather Field, Mills, Calif., completed their flying training and will receive commissions in the Reserve Corps, viz:

James C. Ayers, Walter A. Archer, John M. Barnes, Donald M. Cornell, Paul M. Conner, Robert J. Clohecy, John R. Rand, Sidney C. DuBose, Clarence A. Gilbert, Lloyd L. Hefling, Clinton E. Herberger, Guy F. Hix, Theodore R. Howe, Iver Igelsrud, Andrew J. Marincik, Ive McKinney, John C. McGinn, Leo L. Mellon, Earl C. Pierce, Arthur L. Smith, Max M. Sternberg, Donald A. Templeman.

Of this class, Cadets Hefling, Igelsrud and Ayers took the examination for appointment as 2nd Lieutenants, Regular Army, at the Presidio of San Francisco. The results of their examinations have not yet been determined.

The command at Mather Field, was treated to an interesting lecture on forecasting, meteorology, aviation and sundry subjects, delivered by Thomas R. Reed, of the San Francisco Weather Bureau. Mr. Reed's work in meteorology has been wide and varied. Added to this knowledge is his experience as an aviator with the French and American forces during the war, making him an authority on the subject as applied to flying particularly. His talk was of absorbing interest to his audience, and the information gained will be of great assistance to each flier.

* * *

Kelly Field—Prof. J G. Butler, of the Department of Agriculture, made flights on March 27 and April 1, from Kelly Field, with Lieut. F. P. Booker as pilot, in connection with some experiments he is conducting with a view to determining the origin of the spore of wheat rust in this country. The flight on March 27 was made in a DH4B and the one on April 1 in a JN6H. It is the belief of the officials of the Agricultural Department that the spore of this parasite travels in the upper air from Mexico and possibly Central and South America. Plates with a mucus substance on one side are mounted on a rack on the wing, and by shutter arrangement are exposed from a control in the rear seat, whenever desired. Exposures were made at every 500 ft. up to 3500 ft. with much success. In this experiment the JN6H was more satisfactory than the DH4B, the air stream of which prevented the shutters from closing again.

* * *

Crissy Field—In the event Forestry patrol is authorized for this season, there is not a man in the 91st Squadron at Crissy Field who will not be eager for this duty—which, by the way, is not strange, considering their phenomenal ability to make "smokes" disappear. The Squadron's radio department will be ready. Eight enlisted men have been enrolled in the Signal Corps Radio School being conducted at the Presidio, where they will receive a thorough course in operation and maintenance of radio. Two experienced radio operators are now on duty with the Post Radio Department, and the ships of the 91st are rapidly being equipped with newly overhauled equipment. The pilots and observers are receiving practical instruction by being required to work with the home station while on flights.

* * *

Transfer of Army Airplanes—Fifty DH4's and fifty JN4H's were recently transferred from the Air Service to the Bureau of Naval Aeronautics without transfer of funds. The DH planes are estimated as worth about $9000 and the JN's about $5500 each. Shipment of the DH's was made from the Richmond Intermediate Air Depot to the Philadelphia Navy Yard, while the JN planes were shipped from the Air Service depot at Americus, Ga., to Pensacola Naval Air Station where they will be used for training purposes.

Fairfield Air Intermediate Depot—The JN6HG airplane, which was remodeled at the Fairfield, Ohio, Air Intermediate Depot into a hospital ship, has been completed and, as soon as weather conditions permit, it will be flight tested. From all reports, this is the first airplane of this type that has ever been manufactured. A special litter, constructed in the fuselage and easily accessible by swinging lids, makes a very desirable airplane for the purpose of transporting injured persons. The physician or attendant is provided with a cockpit immediately in front of the litter and just back of the pilot's cockpit facing the tail surfaces. It is so situated that at all times the physician or attendant is able to observe the patient through a window which is cut in the fuselage. This type of ambulance airplane is a decided step forward in transporting injured persons by airplane.

* * *

Army Orders—First Lieut. Russell M. Greenslade, A. S., upon his arrival in the United States, will proceed to Kelly Field, San Antonio, Tex., and report in person to the commanding officer for duty.

Capt. Frank C. Venn, Medical Corps, is relieved from his present temporary duty at the Medical Research Laboratory and School for Flight Surgeon, Mitchel Field, L. I., N. Y., effective upon the completion of his course of instruction, on or about May 1, 1922, and from further assignment and duty at the United States Soldiers' Home, Washington, D. C., and will proceed to Fort Riley, Kan., and report in person to the commanding general for duty as flight surgeon.

First. Lieut. Dogan H. Arthur, A. S., upon his arrival in the United States, will proceed to Langley Field, Hampton Va., and report in person to the commanding officer for duty.

Maj. George E. A. Reinburg, A. S., is detailed as a member of the board of officers appointed by paragraph 10, Special Orders, No. 285-O, War Department, Dec. 9, 1921, known as the War Department Board of Contracts and Adjustments, vice Maj. Roy M. Jones, A. S., hereby relieved.

First Lieut. Michael E. McHugo, A. S., now on temporary duty at Langley Field, Hampton, Va., is relieved from duty at Camp Eustis, Va., and, upon completion of his present course of instruction in the Airship School, will proceed to Aberdeen Proving Ground, Aberdeen, Md., and report in person to the commanding officer for duty with the Air Service troops.

First Lieut. Leslie P. Arnold, A. S., is relieved from further duty at Langley Field, Hampton, Va., will proceed to Montgomery, Ala., and report in person to the commanding officer, Montgomery air intermediate depot, for duty with the 22nd Squadron.

First Lieut. Robert S. Olmsted, A. S., is relieved from temporary duty and training at the Primary Flying School, Carlstrom Field, Fla., will proceed to his proper station, Langley Field, Hampton, Va., and report to the commanding officer for duty.

First Lieut. Rudolph W. Propst, A. S., is relieved from duty at the Long Island air reserve depot, Long Island, N. Y., and will proceed to the Army Building, 39 Whitehall Street, New York City, and report in person to the officer in charge for duty.

Capt. Robert C. Candee, Cavalry, is detailed in the Air Service under the provisions of section 4 of the national defense act, as amended, effective July 1, 1922. Captain Candee will remain on his present duties at Carlstrom Field, Arcadia, Fla., until the beginning of the next course in pilot training for heaver-than-air craft, at which time he will report in person to the commanding officer Carlstrom Field for the purpose of pursuing that course.

Naval Aviation

Handling DH4B's—The Bureau of Aeronautics, Navy Department directs attention of all concerned to the fact that the type DH4B airplane is not designed to stand the strains involved in the performance of loops, Immelman turns, spins or rolls. The DH4B should not be rolled under any circumstances, nor should a dive at a speed in excess of 150 m.p.h. be made.

Navy Orders—Lt. Comdr. Henry B. Cecil, Det. Air Squadrons Atlantic Fleet; to duty Bureau Aeronautics, Navy Dept., Washington, D. C.

Lieut. Lloyd C. Sowell, (Supply Corps), det. Navy Yard Norfolk, Va.; to Naval Air Station Chatham, Mass.

Lieut. George R. Pond, RF, det Naval Air Station San Diego, Cal.; to home and wait orders.

Lieut. Rico Botta, det. Naval Air Sta., Pensacola, Fla.; to Bureau Aeronautics, Navy Dept., Washington, D. C.

Lieut. Edwin Fisher, det. R/Barracks, Hampton Roads, Va.; to USS Langley.

Ens. Bernhard H. Wolter, det. USS Henderson; to duty USS Langley.

Lt. (jg) Herman W. Lucas, RF, det. Naval Air Station, Coco Solo, C. Z.; to home and wait orders.

* * *

Admiral Moffett on Inspection Trip—Rear Admiral Wm. A. Moffett, Chief of Naval Aviation, made a trip to Detroit to inspect the flying facilities and aviation activities there on April 25. He was the guest of the local Chamber of Commerce and addressed three gatherings; one at a luncheon party, another at dinner and finally a large meeting in the evening.

* * *

Hampton Roads Naval Air Station—There were 168 precision flights made during the week ending April 15 by members of the Langley flying detachment, and six practice runs were made on the dummy deck with a DH4 and a VE7 plane. The installation of an arresting gear on a VE7 was completed. An MF boat has been equipped with Aliss-Amphibious landing gear and is ready for tests.

* * *

Flies to Vote on Navy Bill—When the Navy Bill was coming up in the House, Congressman F. C. Hicks, of New York, was en route to the United States on the Navy transport Henderson from the West Indies, anxiously hoping that he would reach the capital in time to vote on the Bill. Reaching Norfolk on April 13, he requested the Commandant of the Naval Base to give him airplane transportation to Washington, which was done and he reached the city in time to vote on the Bill. He is chairman of the sub-committee on Aeronautics, and the hasty flight gave him an opportunity to use an airplane on a practical errand requiring speed.

Coming Aeronautical Events

AMERICAN

May 30 — Fourth Annual Aircraft Exhibition, Logan Field, Baltimore, Md.
May 31 — National Balloon Race, Milwaukee.
June 15-17 — Flying Meet, Monmouth, Ill.
Sept. 4 (about) — Detroit Aerial Water Derby, Detroit. (Curtiss Marine Flying Trophy Competition.)
Sept. 15 (about) — Detroit Aerial Derby, Detroit. (Pulitzer Trophy Race.)
Sept. 30 — First Annual Interservice Championship Meet. (In preparation.)

FOREIGN

August — Coupe Jacques Schneider. (Seaplane speed race.) Naples, Italy.
Aug. 6 — Gordon Bennett Balloon Race, Geneva, Switzerland.
Aug. 6-20 — Soaring and Gliding Competition, Clermont-Ferrand, France.
Aug. 9-24 — Soaring and Gliding Competition, Gersfeld, Germany.
Sept. 22 — Coupe Henri Deutsch de la Meurthe. (Airplane speed race.) France.
American elimination trials, if required, to be held about Aug. 15, at Mitchel Field, L. I.

Foreign News

Czechoslovakia—Engineer Janak, head of the Automobile and Flying Department of the Ministry of Social Welfare, recently concluded with representatives of the German government a provisional agreement on a reciprocal basis regarding regular air service, passengers and goods, between Prague and Berlin. The governments of the two countries will each select a company to participate in the service, which will either be alternatively or simultaneously in opposite directions.

This means that as soon as Germany is permitted by the Peace Treaty to make international flights (end of 1922) German machines will be allowed to fly to Prague and over Czechoslovak territory. A new flying company will be formed at Prague, under the protection of the Legio Bank, with a capital of 8 million kronen. The amount of the government subsidy, which will be paid to this company, has not been fixed, but it is expected that it will be equal to that allotted the Franco-Roumanian company. This new Czechoslovak aviation company will use, as far as possible, airplanes of Czech manufacture. Recently the Aero aircraft factory at Prague has successfully tried out an air transport limousine, which will probably be purchased by the new aviation company. The Aero limousine has a wing area of 52 sq. meters and a carrying power of 40 kg./sq. m., weight 1300 kg., and will have a capacity of five persons and 100 kg. of baggage, and will carry fuel for 4 hr. flight. The engine is a German 260 hp. Maybach.

* * *

Italy—The Army Air Service has instituted a special school for licensed pilots of pursuit airplanes. This school will last for two months, and will be divided into two courses, The first of these comprises acrobatic lessons on dual control ships performed by the pupil together with the instructor on board. After that the pupil will do all the acrobatic drills by himself under the surveillance of the instructor from the ground, until he reaches perfection. The drills include turns on the wing, backwards, reversed, spinning to the right and left, loopings from left to right, side slipping to the left and right, tail sliding, reversed flights, right and left loopings, spiral spinning left and right, and reversed spinning left and right.

The second course comprises aerial pursuit drills. The pilot, after becoming a perfect acrobat, will perform a combat against another airplane driven by the instructor. These aerial combats will enable the pilot to get accustomed to the acrobatic stunts which will be employed not only in defending himself but also attacking his enemy, according to the different aerial tricks which the school will teach.

After the pilots have passed this test two of them, in airplanes of the same type, will fly in opposite directions, and at a height of 3000 ft. they will start an aerial fight which will last 30 min. Each airplane will be provided with a photographic sight in order to photograph the opposite airplane when this is in a condition of inferiority. A test commission will judge the result of this aerial fight. The pilot whom the Commission considers superior to his adversary will be approved, while the defeated pilot must repeat the test according to the following system:

With twenty approved acrobatic pilots, ten couples will be formed; of these ten couples it will result "ten approved" and ten "defeated." Of the "defeated" ten "five" couples will be formed, of which five will be "approved" and five "defeated." The defeated five must couple with pilots already approved and if their result is superior to their adversary they will be approved, if contrary the course must be repeated.

A license will be given to the approved pilots.

* * *

Russia—A statement in a Russian newspaper announces the formation of a Russo-German air traffic company, which will begin operations by establishing an air route between Moscow and Königsberg, to connect with the Berlin-Königsberg express train services. An agreement has already been concluded between the Russian commercial delegation in Berlin and Germen interests, among whom are Herr Rathenau's organization, the General Electrical Co., the Hamburg-Amerika Line, and the Zeppelin Co.

Where to Fly

CALIFORNIA
SAN FRANCISCO, CALIFORNIA
EARL P. COOPER AIRPLANE & MOTOR CO.

ILLINOIS
PARTRIDGE, Inc.
Aeronautical Instruction
Aero Club of Illinois Field. Chicago, Ill.
Mail Address-- 430 S. Michigan Ave.
Write for Booklet

INDIANA
One of the largest and best equipped flying fields in the United States.
CURTISS-INDIANA COMPANY
Kokomo, Indiana
ALL TYPES OF CURTISS PLANES.

MASSACHUSETTS
BOSTON AND SPRINGFIELD, MASS.
EASTERN AIRCRAFT CORP.
340 FIRST ST., BOSTON, MASS.

MINNESOTA
WHITE BEAR LAKE, MINN.
The Twin Cities' chief summer resort.
Harold G. Peterson Aircraft Company
SCHOOL OF AVIATION

NEW JERSEY NEW YORK AIR TERMINAL
800 Acres -- 6 miles from Times Square.
Learn on ships that cannot tail spin. Planes rented $30. hr.
CHAMBERLIN AIRCRAFT
Hasbrouck Heights, N. J.

NEW YORK & NEW JERSEY
CURTISS FIELD, GARDEN CITY, LONG ISLAND
KENILWORTH FIELD, BUFFALO, N. Y.
FLYING STATION, ATLANTIC CITY, N. J.
CURTISS AEROPLANE & MOTOR CORPORATION

NEW YORK
AEROMARINE AIRWAYS, INC.
Times Building, New York
11 Passenger Flying Cruisers -- 5 passenger, open and enclosed Flying Boats. Sightseeing Tours - Flights to Shore and Lake Resorts

OHIO
DAYTON, OHIO.
Supplies, Hangars, Shops and Field 1 Mile from Dayton limits.
JOHNSON AIRPLANE & SUPPLY CO.

OREGON
LAND OR WATER FLYING
OREGON, WASHINGTON AND IDAHO AIRPLANE COMPANY
PORTLAND, OREGON

PENNSYLVANIA
Flying School and Commercial Aviation
Send for Circular
Official Flying field Aero Club of Pennsylvania
PHILADELPHIA AERO-SERVICE CORPORATION
636 Real Estate Trust Building, Philadelphia.

WISCONSIN
CURTISS-WISCONSIN AEROPLANE CO.
FLYING SCHOOL
Milwaukee Air Port
GILLES E. MEISENHEIMER
330 Clinton Street Milwaukee, Wis.

If you are one of the companies in your state having first class facilities for passenger carrying, pilots' training and special flights, you should be represented in WHERE TO FLY each week.
26 Consecutive Insertions $20.00